

***Remarks***

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-112 are pending in the application, with claims 5, 48, 61, 85, 93, 95, 97, and 110 being the independent claims. The specification and claims 1, 5, 6, 9, 12, 16, 29, 32, 37, 39, 41, 42, 46, 48, 49, 56, 61, 64, 71, 78, 80, 82, 85, 93, 94, 95, 96, 97, 101, 102, 104, 107, 108, and 109 are sought to be amended, and new claims 110-112 are sought to be added. The specification has been amended to correct obvious errors in naming the compounds. Support for the amendments and new claims 110-112 can be found in the original specification and claims as originally filed. Specifically, support for the amendments made in the specification can be found, *inter alia*, at page 56, line 14, and the structure of Jeffamine at page 65, i.e.,  $\text{H}_2\text{N}-(\text{CH}_2)_2-\text{O}-(\text{CH}_2)_2-\text{O}-(\text{CH}_2)_2-\text{NH}_2$ .

Support for the addition of --an alkynyl-- and --alkynyl-- for the definition of  $\text{R}_1$ ,  $\text{R}_3$ ,  $\text{R}_4$ , and  $\text{R}_6$  in claims 1, 5, 85, 93, 95, and 97, and in claims 12 and 16, respectively, can be found, *inter alia*, in original claim 1, lines 17-19, and original claim 16, line 10.

The phrase "an alkyl or" in claim 1, line 14, and in claims 5, 85, 93, 95, and 97, respectively, has been canceled as redundant. The phrase --, wherein any one of  $\text{R}_1$ - $\text{R}_6$  are-- has been inserted after "alkyl ether" in claim 1, line 14, and in claims 5, 93, 95, and 97, respectively. Similarly, the phrase --, wherein any one of  $\text{R}_1$ ,  $\text{R}_3$ ,  $\text{R}_4$ , and  $\text{R}_6$  are-- has been inserted after "alkyl ether" in claim 85, line 11. Support for these amendments can be found, *inter alia*, in claims 15-28, 41, 66-69, 73-76, and 80-84 as originally filed.

Support for the addition of definitions for i, j, k, and l in claim 1 can be found, *inter alia*, in claim 93 as originally filed.

Claim 5 has amended to be an independent claim. The replacement of "at least one of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> is" with --at least two of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> are . . . attached to each N-- in claims 5, 9, 12, 16, 95, and 97 is supported by, *inter alia*, original claims 10, 13, 17-19, 23-28, 30, 31, 33-36, 43, 44, 47, 50-54, 57-62, 65-69, 72-76, and 79-84, and Scheme 3 at page 65 of the specification as filed. Claims 6, 29, 32, 42, 46, 49, 56, 64, 71, 78, and 96 have been amended accordingly.

The deletion of "alkyl" in claim 5, line 18, after "cyclic", and respectively in claims 6, 9, 12, 16, 29, 32, 42, 46, 49, 56, 64, 71, 78, 95, 96, and 97, is supported by, *inter alia*, claims 10, 13, 17, 18, 19, 23-28, 30, 31, 33-36, 43, 44, 47, 50-54, 57-62, 65-69, 72-76, and 79-84 as originally filed. Applicants submit that no new matter has been introduced by this amendment since deletion of individual members of a Markush expression does not constitute new matter. *See, In re Johnson and Farnham*, 194 USPQ 187 (CCPA 1977).

Claim 5 has been amended by excluding R<sub>1</sub> and R<sub>4</sub> or R<sub>3</sub> and R<sub>6</sub> to form a cyclic moiety.

The proviso 1) in claims 5, 95 and 97 is supported by, *inter alia*, claims 9, 12, 15, 16, 20, 21, 29, 32, 48, 49, 51, 54, 55, 56, 63, 64, 66, 70, 71, 73, 77, 78-80, and 84 as originally filed. The proviso 2) in claims 5, 95, and 97 is supported by, *inter alia*, claims 10, 13, 17, 18, 19, 23, 25, 27, 29-40, 43, 44, 47, 50-54, 57-62, 65-69, 72-76, and 79-84 as originally filed. Claims 9, 12, 16, 42, 46, 49, 56, 64, 71, and 78, dependent on claim 5, have been amended accordingly.

Claim 48 has been amended to an independent claim. Support for this amendment can be found in claim 1 as originally filed.

Claims 61 and 85 have been amended to independent claims.

Claim 93 has been amended by inserting a further requirement for R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub>. Support for this amendment can be found, *inter alia*, in claims 11-16, 20-22, 32-41, 51-52, 54, and 55-84 as originally filed.

Claims 37, 39, 41, 80, and 82 have been amended to make them dependent claims.

Support for the new claim 110 is found, *inter alia*, in claim 93 as originally filed. Support for the new claim 111 is found at page 56, line 19, through page 57, line 4, and at page 58, line 23, through page 59. Support for the new claim 112 is found at page 65, structure XIV.

These changes are believed to introduce no new matter, and their entry is respectfully requested.

The Examiner has indicated at page 1 of the Office Action that claims 10-28, 30-41, and 43-92 are rejected, and that claims 1-9, 29, 42, and 93-109 are objected to. Applicants assume the Examiner intended to indicate that claims 10-28, 30-41, and 43-92 are objected to, and claims 1-9, 29, 42, and 93-109 are rejected. Clarification is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

***Drawings***

Applicants are pleased to note that the drawings filed on November 12, 1999, have been approved by the Draftsperson.

***Rejections under 35 U.S.C. § 112, second paragraph***

The Examiner has rejected claims 1 and 93 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse as it applies to the amended claims 1 and 93.

Specifically, the Examiner states that claim 1 recites the term "wherein" twice. Further, the Examiner states that claim 93 provides a definition for terms "j, k, l and l [sic]," but that no structure in the recited compound corresponds to these terms.

Applicants have amended claims 1 and 93 to make them more clear by deleting the first "wherein" in claim 1, and by deleting the phrase "i, j, k, l," in claim 93.

Reconsideration and withdrawal of the rejection of claims 1 and 93 under 35 U.S.C. § 112, second paragraph, are respectfully requested.

***Rejections under 35 U.S.C. § 102***

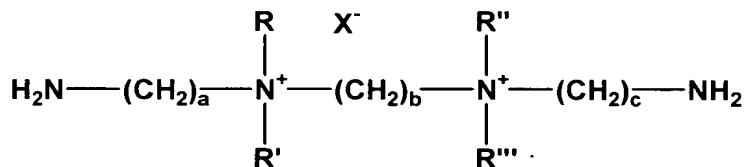
To anticipate a claim, the reference must teach each and every element of the claim. M.P.E.P. § 2131.

*I Wolff et al.*

The Examiner has rejected claims 1-9, 93, 95-105, and 107-109 under 35 U.S.C. § 102(b) as being anticipated by Wolff *et al.* (WO 98/29541). Applicants respectfully traverse this rejection as it applies to the claims as amended.

The Examiner states that Wolff *et al.* teach each and every aspect of the instant invention thereby anticipating Applicants claimed invention. Specifically, the Examiner alleges that Wolff *et al.* disclose compounds according to the formula recited in claim 93, wherein Q is N, R<sub>1</sub>-R<sub>6</sub> are selected from alkyl groups, polyethyleneglycol chains, polysaccharides and alkylamines; A<sub>1</sub> and A<sub>2</sub> are selected from (CH<sub>2</sub>)<sub>n</sub>, C(NH) or CH<sub>2</sub>NH, and L is an alkyl moiety, referring to compounds on pages 64-65 of Wolff *et al.*

The only compound recited on page 64, in claim 23, of Wolff *et al.* has the following formula:

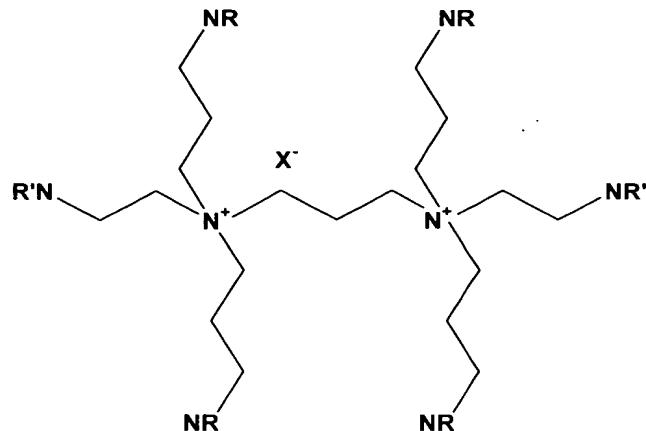


wherein the substituents R-R'' are selected from the group consisting of a stearic stabilizer and hydrogen, and the aminoalkyl groups may include from 1 to 20 carbon atoms. Page 11, lines 1-4, defines a stearic stabilizer as "a long chain hydrophilic group that prevents aggregation of final polymer by sterically hindering particle electrostatic interactions. Examples include: alkyl groups, PEG chains, polysaccharide, hydrogen molecules, alkyl amines." However, at least one of R-R'' is not described as "a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms"

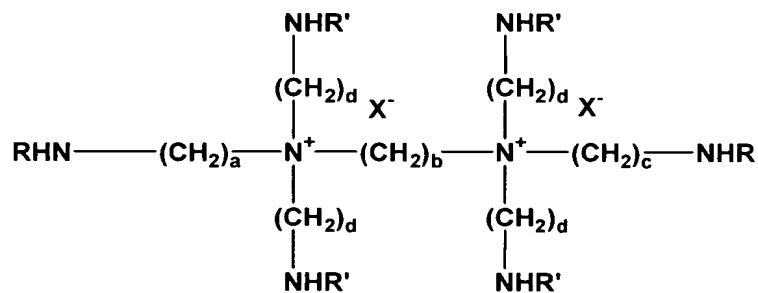
as required in original independent claims 93, 95 and 97 of the present application and, thus, original claims 93, 95 or 97, or any claim dependent on any of those claims, are not anticipated by the compound on page 64 of Wolff *et al.*

The compounds recited on page 65, in claims 24 and 25, of Wolff *et al.* have the following formulae:

Claim 24:



Claim 25:



Substituents R and R' in claim 24 attached to the aminoalkyl groups are defined as a protecting group 1 and an orthogonal protecting group 2, respectively. Further, substituents R and R' in claim 25 attached to the aminoalkyl groups are selected from the group consisting of orthogonal protecting molecules, targeting molecules, steric stabilizers, and hydrogen. Thus, neither claim 24 nor claim 25 requires at least one of R or R' be "a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms" as required in original independent claims 93, 95 and 97 of the present application. Therefore, original claims 93, 95 or 97, or any claim dependent on any of those claims, are not anticipated by compounds on page 65 of Wolff *et al.*

Applicants have amended claims 1, 5, 6, 9, 93, 95-97, 101, 102, 104, and 107-109 as discussed above. It is submitted that Wolff *et al.* do not disclose any compounds within the scope of the genuses of amended claims 5, 93, 95 or 97. Thus, Applicants submit that Wolff *et al.* do not anticipate any of claims 5, 93, 95 and 97, or any claim dependent on any of those claims. Reconsideration and withdrawal of the rejection of claims 1-9, 93, 95-105, and 107-109 under 35 U.S.C. § 102(b) are respectfully requested.

## ***II        Budowsky et al.***

The Examiner has rejected claims 1-2, 5-6, 93, and 95-98 under 35 U.S.C. § 102(e) as being anticipated by Budowsky *et al.* (U.S. 6,093,564). Applicants respectfully traverse this rejection.

The Examiner alleges that Budowsky *et al.* "disclose compositions according to formula I of the instant application, wherein X=N, and R1, R2, are hydrogen or a

hydrocarbon moiety; L is a divalent hydrocarbon containing between 3 and 4 carbon atoms, inclusive (see the compounds in col. 4-5)."

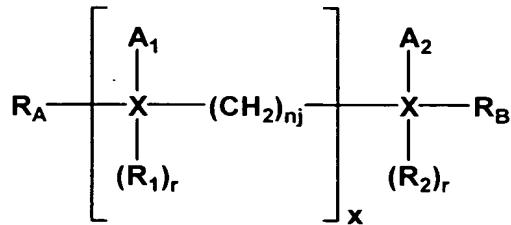
Applicants submit that contrary to the Examiner's allegations, Budowsky *et al.* do not disclose any compounds falling within the scope of original claims 1-2, 5-6, 93, 95 and 95-98, or any other claim. Original claims 1-2, 5-6, 93, 95 and 95-98 specifically require that "at least one of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> is a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from 6 to about 64 carbon atoms". The monovalent hydrocarbon moieties of Budowsky *et al.* contain from 1 to 4 carbon atoms. See, column 4, lines 26, 42, and 54, and column 5, lines 1 and 27. Thus, Budowsky *et al.* do not teach each and every element of original claims 1-2, 5-6, 93, 95 and 95-98. Further, it is submitted that Budowsky *et al.* do not teach each and every element of claims 1-2, 5-6, 93, 95 and 95-98 as amended.

Reconsideration and withdrawal of the rejection of claims 1-2, 5-6, 93, 95 and 95-98 under 35 U.S.C. § 102(e) are respectfully requested.

### ***III Haces et al. (U.S. 5,834,439)***

The Examiner has rejected claims 1-2, 5-6, 9, 29, 42, 93-98, and 101-109 under 35 U.S.C. § 102(e) as being anticipated by Haces *et al.* (U.S. 5,834,439). Applicants respectfully traverse this rejection as it applies to the claims as amended.

Haces *et al.* is directed to highly packed polycationic ammonium, sulfonium and phosphonium lipid compounds of Formula I:



wherein  $(CH_2)_{nj}$  corresponds to  $L$  of claim 93.  $R_A$  and  $R_B$  of Formula I correspond to  $R_2$  and  $R_5$  of claim 93.  $R_1$  and  $R_2$  of Formula I correspond to  $R_3$  and  $R_6$  of claim 93. The definitions for  $R_A$ ,  $R_B$ ,  $R_1$ ,  $R_2$ ,  $A_1$  and  $A_2$  are recited in column 3, line 64 through column 4, line 50.

The Examiner alleges that

[t]he compounds of Haces *et al.* are encompassed by those of the instant application R1-R6 and A1-A2 (according to formula recited in claim 93) are selected from alkyl groups, hydroxyalkyl groups, straight or branched alkyl groups unsubstituted or substituted with one or two OH, SH, NH2 or amine groups, or an aromatic, alicyclic, heterocyclic or polycyclic ring moiety which may be substituted with OH, SH, NH2, CH3, COCH3 or carbonyl groups.

Applicants respectfully disagree. However, in order to expedite the prosecution of the pending claims, Applicants have amended claim 93 as described above to further require that at least one of  $R_2$ ,  $R_3$ ,  $R_5$  and  $R_6$  is selected from a list of substituents supported by the specification and claims as originally filed. Further, Applicants have amended claims 5, 95 and 97 to further require that at least two of  $R_1$ ,  $R_3$ ,  $R_4$ , and  $R_6$  are a straight or branched, cyclic, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms attached to each N, and to include the proviso 1). Claim 5 has also been amended to read as an independent claim.

Applicants submit that Haces *et al.* do not teach each and every aspect of the invention and, thus, do not anticipate any of claims 5, 93, 95 or 97, or any claim dependent

on any of those claims. Reconsideration and withdrawal of the rejection of claims 1-2, 5-6, 9, 29, 42, 93-98, and 101-109 under 35 U.S.C. § 102(e) are respectfully requested.

***IV Haces et al. (WO 97/42819 A1)***

The Examiner has rejected claims 1-2, 5-6, 9, 29, 42, 93, 95-98, and 101-109 under 35 U.S.C. § 102(a) as being anticipated by Haces *et al.* (WO 97/42819 A1). Applicants respectfully traverse this rejection as it applies to the claims as amended.

The Examiner alleges that Haces *et al.* disclose genus of compounds that encompasses compounds of the instant application directing the attention to formula I at page 4 of Haces *et al.* Specifically, the Examiner alleges that

[t]he compounds of Haces et al., anticipate those compounds of the instant invention (using terms set forth in the formula found in claim 93), wherein R3 and R6 are alkyl groups, R1 and R4 are alkyl, or an ester, R2 and R5 are hydrogen, C1-C18 linear alkyl, cyanoethyl, aminopropyl, aminobutyl, C2-C4 alkyl guanidinium or amidinium, C or N substituted spermine. Additionally, the compounds of Haces et al. comprises those wherein R3 and R6 are not present, specifically when i=0 of the (R3)<sub>i</sub> in the compounds according to formula (I) of Haces et al.

Applicants respectfully disagree. However, in order to expedite the prosecution of the pending claims, Applicants have amended claim 93 to further require that at least one of R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub> is selected from a list of substituents supported by the specification and claims as originally filed. Further, Applicants have amended claims 5, 95 and 97 to further require that at least two of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>6</sub> are a straight or branched, cyclic, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms attached to each N, and

to include provisos 1) and 2). Claims 6, 9, 29, and 42 have been amended according to claim 5 they are dependent from.

Applicants submit that Haces *et al.* do not teach each and every aspect of the invention and, thus, do not anticipate any of claims 5, 93, 95 and 97, or any claim dependent on any of those claims. Reconsideration and withdrawal of the rejection of claims 1-2, 5-6, 9, 29, 42, 93, 95-98, and 101-109 under 35 U.S.C. § 102(a) are respectfully requested.

*V*      ***Henkel (FR 1567214)***

The Examiner has rejected claims 1-2, 5-6, 93, and 95-98 under 35 U.S.C. § 102(b) as being anticipated by Henkel (FR 1567214). Applicants respectfully traverse this rejection as it applies to the claims as amended.

The Examiner alleges that Henkel discloses "polycationic compounds according to the instant invention wherein (referring to the nomenclature in claim 93) Q is N, A1 and A2 are (CH<sub>2</sub>)<sub>t</sub> and R<sub>1</sub>-R<sub>6</sub> are alkyl moieties that may be saturated or unsaturated (paragraph bridging pages 1-2)."

Applicants have amended claim 93 to further require that at least one of R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub> is selected from a list of substituents supported by the specification and claims as originally filed. Further, Applicants have amended claims 5, 95 and 97 to further require that at least two of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>6</sub> are a straight or branched, cyclic, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms attached to each N, and to include proviso 1). Claim 6 has been amended according to claim 5 it is dependent from.

It is submitted that Henkel does not disclose any compounds within the scope of the genuses of amended claims 5, 93, 95 and 97. Thus, Applicants submit that Henkel does not

teach each and every aspect of the invention and, therefore, does not anticipate any of claims 5, 93, 95 and 97, or any claim dependent on any of those claims. Reconsideration and withdrawal of the rejection of claims 1-2, 5-6, 93, and 95-98 under 35 U.S.C. § 102(b) are respectfully requested.

***Allowable Subject Matter***

Applicants note that the Examiner has indicated claims 10-28, 30-41, and 43-92 to be free of prior art of record.

***Conclusion***

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn.

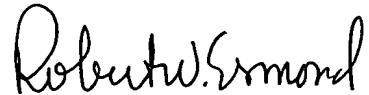
In view of the foregoing remarks, Applicants submit that the claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references cited against this application. Applicants therefore request the entry of this Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

It is believed that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner

believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Robert W. Esmond  
Attorney for Applicants  
Registration No. 32,893

Date: Sept. 28, 2001

1100 New York Avenue, N.W.  
Suite 600  
Washington, D.C. 20005-3934  
(202) 371-2600

P:\USERS\TARJAHN\0942\0942.4650001\P105-58.wpd

**Version with markings to show changes made**

***In the Specification:***

The paragraph beginning on page 56, line 16, through page 57, line 4 has been substituted with the following paragraph:

The following compounds were synthesized by the above method using the corresponding diamine and a long chain acyl chloride:

$N^1,N^4$ -dimyristyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminobutane;  
 $N^1,N^4$ -dipalmityl- $N^1,N^4$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminobutane;  
 $N^1,N^4$ -dipalmitolyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminobutane;  
 $N^1,N^4$ -distearyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminobutane;  
 $N^1,N^4$ -dilauryl- $N^1,N^4$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminobutane;  
 $N^1,N^2$ -dimyristyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,N^2$ -dipalmityl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,N^2$ -dipalmitolyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,N^2$ -distearyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,N^2$ -dilauryl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,N^2$ -dioleyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-aminopropyl)]-diaminoethane;  
 $N^1,[N^9]N^8$ -dimyristyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine;  
 $N^1,[N^9]N^8$ -dipalmityl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine;  
 $N^1,[N^9]N^8$ -dipalmitolyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine;  
 $N^1,[N^9]N^8$ -distearyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine;  
 $N^1,[N^9]N^8$ -dilauryl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine;  
 $N^1,[N^9]N^8$ -dioleyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-aminopropyl)]-Jeffamine.

The paragraph beginning on page 58, line 21, through page 59, line 26 has been substituted with the following paragraph:

The following compounds were synthesized using the protocol described above starting with the requisite diamine and long chain acyl chloride:

$N^1,N^4$ -dimyristyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminobutane;

$N^1,N^4$ -dipalmityl- $N^1,N^4$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminobutane;

$N^1,N^4$ -dipalmitolyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminobutane;

$N^1,N^4$ -distearyl- $N^1,N^4$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminobutane;

$N^1,N^4$ -dilauryl- $N^1,N^4$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminobutane;  
 $N^1,[N^9]N^8$ -dimyristyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,[N^9]N^8$ -dipalmityl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,[N^9]N^8$ -dipalmitoyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,[N^9]N^8$ -distearyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,[N^9]N^8$ -dilauryl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,[N^9]N^8$ -dioleyl- $N^1,[N^9]N^8$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-Jeffamine;  
 $N^1,N^2$ -dimyristyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane;  
 $N^1,N^2$ -dipalmityl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane;  
 $N^1,N^2$ -dipalmitoyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane;  
 $N^1,N^2$ -distearyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane;  
 $N^1,N^2$ -dilauryl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane;  
 $N^1,N^2$ -dioleyl- $N^1,N^2$ -di-[2-hydroxy-3-(N-sperminecarboxamido)-aminopropyl]-diaminoethane.

The paragraph beginning on page 64, line 5 has been substituted with the following paragraph:

The cholesterol analogs can be synthesized by using the scheme given below (Scheme 3). [Jefamine] **Jeffamine** is alkylated with cholestryl chloride to provide the dicholestryl jefamine analog (XII). Further alkylation with the epoxide phthalamide (XIII) and deblocking with hydrazine gives the compound of the invention (XIV).

***In the Claims:***

New claim 110-112 have been added.

Claims 1, 5, 6, 9, 12, 16, 29, 32, 37, 39, 41, 42, 46, 48, 49, 56, 61, 64, 71, 78, 80, 82, 85, 93, 94, 95, 96, 97, 101, 102, 104, 107, 108, and 109 have been amended.

1. (Twice amended) The compound as claimed in claim 93, [wherein]  
wherein

L is C, CH,  $(CH_2)_l$ , or  $\{(CH_2)_i - Y - (CH_2)_j\}_k$ , wherein Y is selected from the group consisting of  $CH_2$ , an ether, a polyether, an amide, a polyamide, an ester, a sulfide, a urea, a thiourea, a guanidyl, a carbamoyl, a carbonate, a phosphate, a sulfate, a sulfoxide, an imine, a carbonyl, and a secondary amino group and wherein Y is optionally substituted by  $-X_1 - L' - X_2 - Z$  or  $-Z$ ;

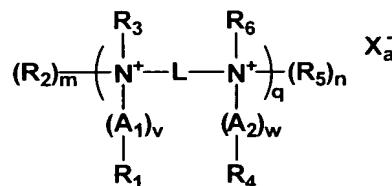
$R_1 - R_6$ , independently of one another, are selected from the group consisting of H,  $-(CH_2)_p - D - Z$ , an alkyl, an alkenyl, an alkynyl, an aryl, and [an alkyl or] alkyl ether, wherein any one of  $R_1 - R_6$  are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, an alkylthio, a urea, a thiourea, a guanidyl, or a carbamoyl group, and wherein at least one of  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$  is a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms; and  $R_1$  and  $R_4$  or  $R_3$  and  $R_6$  may optionally be covalently linked with each other, with Y or with L when L is C or CH to form a cyclic moiety;

$X_1$  and  $X_2$ , independently of one another, are selected from the group consisting of NH, O, S, alkylene, and arylene; [and]

$L'$  is selected from the group consisting of alkyl, alkenylene, alkynylene, arylene, alkylene ether, and polyether; and

$i, j, k, and l$  are integers from 0 to about 100.

5. (Twice amended) A [The] compound [as claimed in claim 1, wherein said compound has] having the formula:



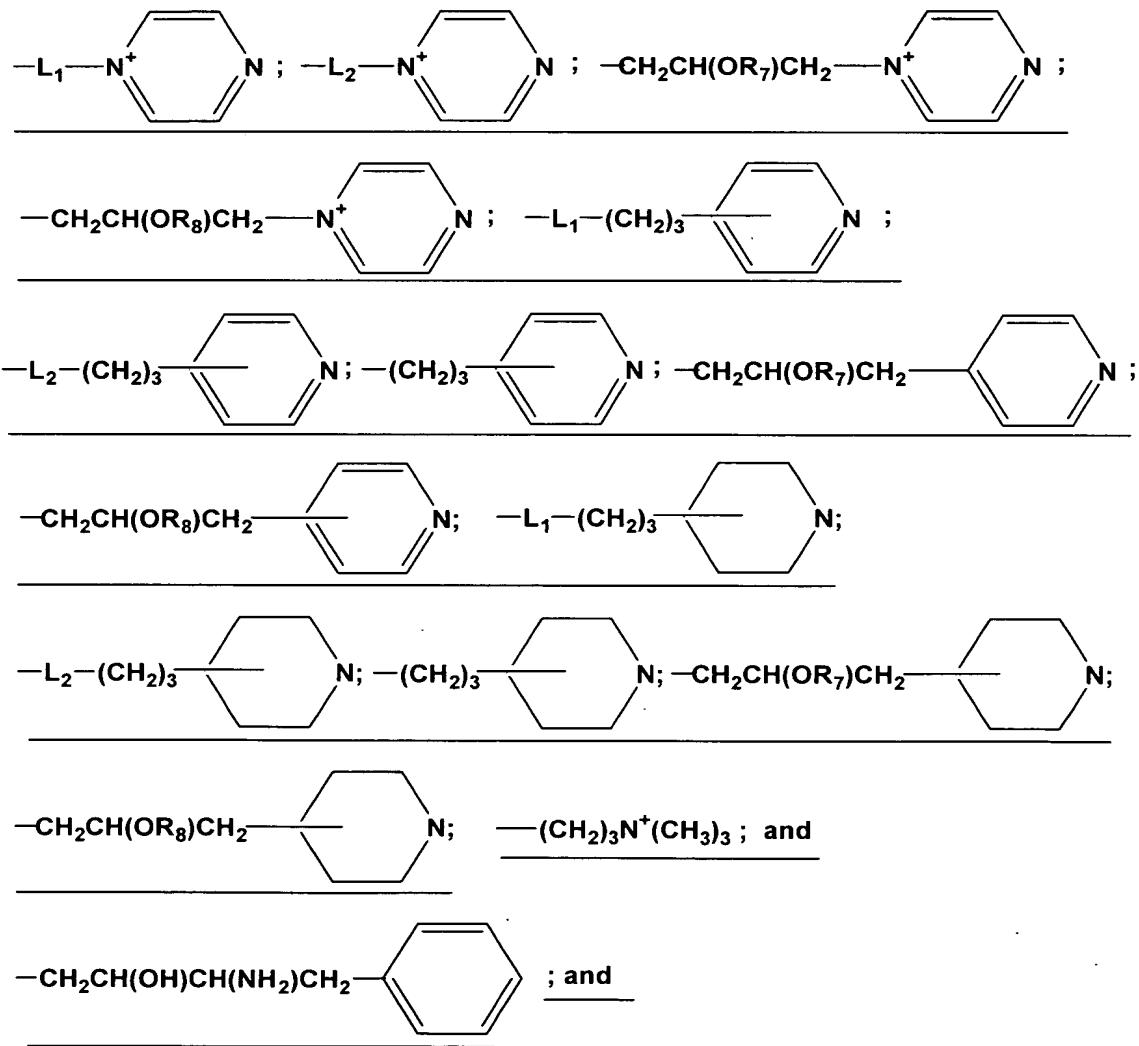
wherein

L is  $(CH_2)_l$  or  $\{(CH_2)_i - Y - (CH_2)_j\}_k$ , wherein Y is selected from the group consisting of  $CH_2$ , an ether, a polyether, an amide, a polyamide, an ester, a sulfide, a urea, a thiourea, a guanidyl, a carbamoyl, a carbonate, and a secondary amino group;

$R_1 - R_6$ , independently of one another, are selected from the group consisting of H,  $-(CH_2)_p - Z$ , an alkyl, an alkenyl, an alkynyl, an aryl, and [an alkyl or] alkyl ether, wherein any one of  $R_1 - R_6$  are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] two of  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$  [is] are a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms attached to each N; [and  $R_1$  and  $R_4$  or  $R_3$  and  $R_6$  may optionally be covalently linked with each other to form a cyclic moiety;] provided that

1) when L is alkylene and R<sub>1</sub> and R<sub>4</sub> both are alkenyl of about 6 to about 64 carbon atoms, then at least R<sub>2</sub> and R<sub>5</sub> or R<sub>3</sub> and R<sub>6</sub> are independently selected from the group consisting of

-(CH<sub>2</sub>)<sub>b</sub>-NH<sub>2</sub>; -(CH<sub>2</sub>)<sub>c</sub>-NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>;  
-(CH<sub>2</sub>)<sub>b</sub>NHC(O)Z; -(CH<sub>2</sub>)<sub>c</sub>NHC(O)Z; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(O)Z;  
-CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(O)Z; -L<sub>1</sub>-NHC(NH)NH<sub>2</sub>; -L<sub>2</sub>-NHC(NH)NH<sub>2</sub>;  
-CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>;  
-L<sub>1</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>; -L<sub>2</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>;  
-(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>2</sub>]-CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>;  
-(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>2</sub>]-CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>;



2) when q is 1, R<sub>1</sub> - R<sub>6</sub> are other than H;

L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether;

R<sub>7</sub> and R<sub>8</sub> are independently H or a carbohydrate;

Z is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, peptide, and protein;

A<sub>1</sub> and A<sub>2</sub>, independently of one another, are selected from the group consisting of CH<sub>2</sub>O, CH<sub>2</sub>S, CH<sub>2</sub>NH, C(O), C(NH), C(S) and (CH<sub>2</sub>)<sub>2</sub>;

X is a physiologically acceptable anion;

b and c are integers independently selected from 1 to about 4;

m, n, v and w are 0 or 1;

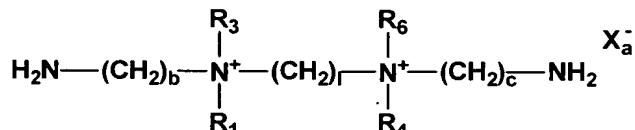
i, j, k, l, p and t are integers from 1 to about 100;

q is an integer from 1 to about 1000; and

a is the number of positive charge divided by the valence of the anion, wherein when m and n are 0, then a is 0.

6. (Once amended) The compound as claimed in claim 5, wherein at least [one] two of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> [is] are a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl having from about 8 to about 24 carbon atoms.

9. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:

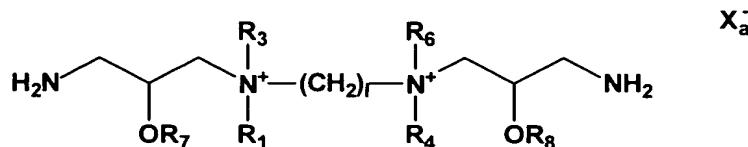


wherein

R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub>, independently of one another, are selected from the group consisting of [H and] a C<sub>1</sub>-C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] two of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> [is] are a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms attached to each N; and

l, b and c are integers independently selected from 1 to about 4.

12. (Once amended) The compound as claimed in claim [11] 5, wherein said compound has the formula:

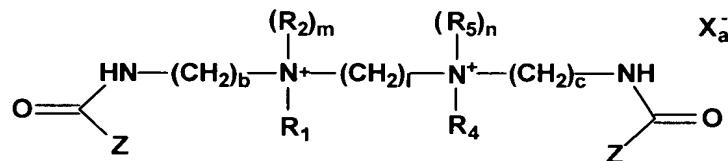


wherein

$R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$ , independently of one another, are selected from the group consisting of [H and] a  $C_1$ - $C_8$  alkyl, alkenyl, alkynyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] two of  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$  [is] are a straight chain or branched, cyclic, [alkyl,] alkenyl, [alkenyl] alkynyl or aryl group having from about 8 to about 24 carbon atoms attached to each N;

$R_7$  and  $R_8$  are independently H or a carbohydrate; and  $l$  is an integer from 1 to about 4.

16. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

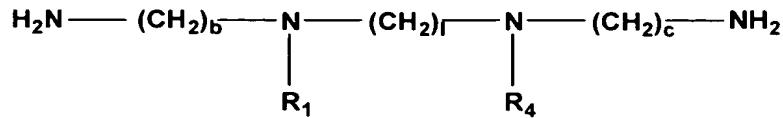
$R_1$ ,  $R_2$ ,  $R_4$  and  $R_5$ , independently of one another, are selected from the group consisting of [H and] a  $C_1$ - $C_8$  alkyl, alkenyl, **alkynyl**, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] **two** of  $R_1$ ,  $R_2$ ,  $R_4$  and  $R_5$  [is] **are** a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms **attached to each N**;

Z is selected from the group consisting of spermiyl, spermidyl, amino acid, peptidyl, diaminoalkyl, and polyamine;

m and n are 0 or 1; and

$l$ ,  $b$  and  $c$  are integers independently selected from 1 to about 4.

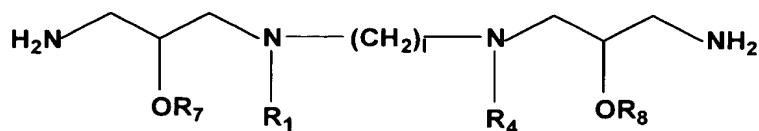
29. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of  $\text{R}_1$  and  $\text{R}_4$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms; and  
 $l$ ,  $b$  and  $c$  are integers independently selected from 1 to about 4.

32. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:

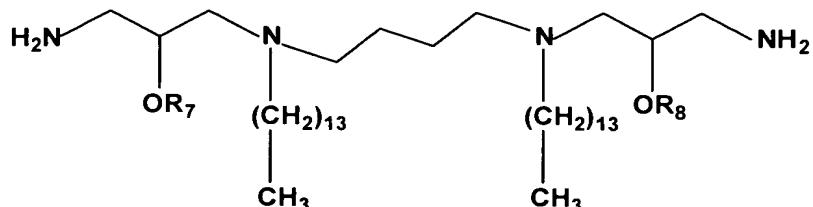


wherein

[at least one] each of  $\text{R}_1$  and  $\text{R}_4$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;  $\text{R}_7$  and  $\text{R}_8$  are independently hydrogen or a carbohydrate; and

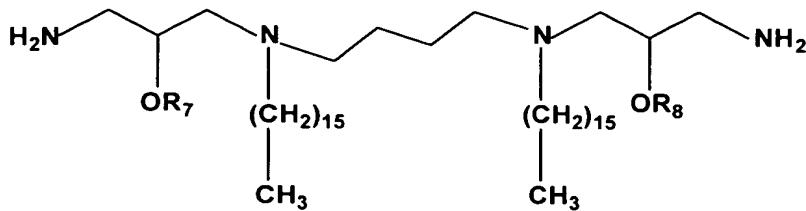
$l$  is an integer from 1 to about 4.

37. (Once amended) The compound as claimed in claim [32] 1, which is:



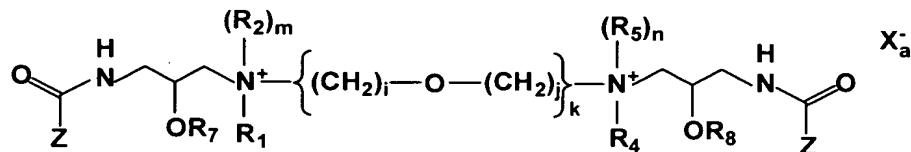
wherein  $\text{R}_7$  and  $\text{R}_8$  independently are H or a carbohydrate.

39. (Once amended) The compound as claimed in claim [32] 1, which is:



wherein R<sub>7</sub> and R<sub>8</sub> are H or a carbohydrate.

41. (Once amended) The compound as claimed in claim [5] 1, wherein said compound has the formula:



wherein

[Z is as defined in claim 5;]

at least one of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of H and a C<sub>1</sub>-C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

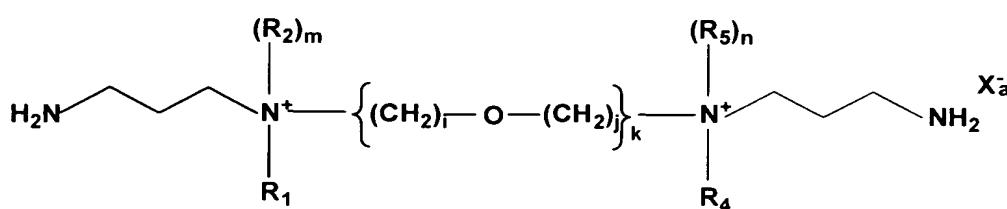
R<sub>7</sub> and R<sub>8</sub> are independently H or a carbohydrate;

m and n are 0 or 1;

i and j are integers from about 2 to about 3; and

k is an integer from 1 to about 3.

42. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of  $R_1$  and  $R_4$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

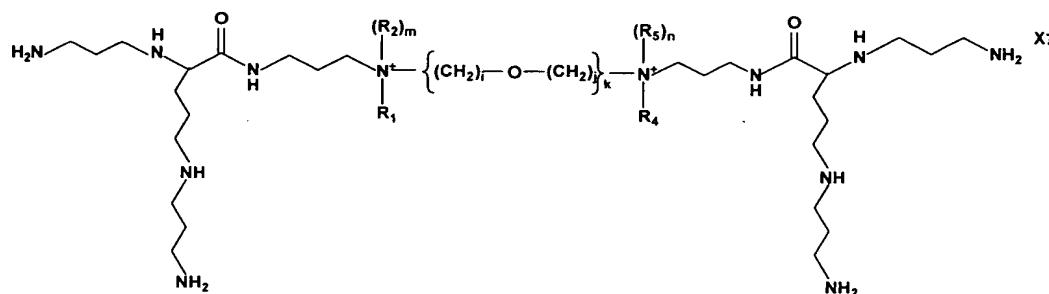
$R_2$  and  $R_5$ , independently of one another, are selected from the group consisting of [H and] a  $C_1$ - $C_8$  alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

$m$  and  $n$  are 0 or 1;

$i$  and  $j$  are integers from about 2 to about 3; and

$k$  is an integer from 1 to about 3.

46. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of  $R_1$  and  $R_4$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

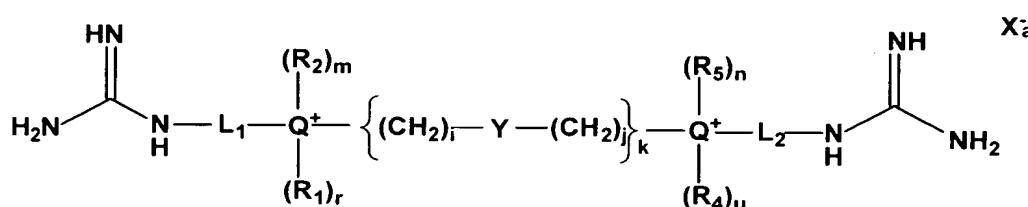
$R_2$  and  $R_5$ , independently of one another, are selected from the group consisting of [H and] a  $C_1$ - $C_8$  alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

$m$  and  $n$  are 0 or 1;

$i$  and  $j$  are integers from about 2 to about 3; and

$k$  is an integer from 1 to about 3.

48. (Once amended) [The] A compound [as claimed in claim 1, wherein said compound has] having the formula:



wherein

Q is selected from the group consisting of N, O, and S[, R<sub>1</sub>, R<sub>4</sub>, r, u, m and n are as defined in claim 1];

R<sub>1</sub> and R<sub>4</sub>, independently of one another, are selected from the group consisting of H, -(CH<sub>2</sub>)<sub>p</sub>-D-Z, an alkyl, an alkenyl, an alkynyl, an aryl, and alkyl ether, wherein any of R<sub>1</sub> and R<sub>4</sub> are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, an alkylthio, a urea, a thiourea, a guanidyl, or a carbamoyl group, and wherein at least one of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms;

D is Q or a bond;

p is an integer from 0 to about 100;

Z is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, peptide, and protein;

m, n, r, and u are 0 or 1;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of H and a C<sub>1</sub> - C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

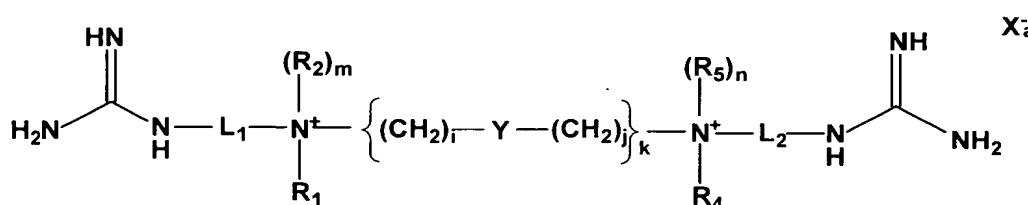
i and j are integers from about 2 to about 3;

k is an integer from 1 to about 3;

L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether; and

Y is selected from the group consisting of CH<sub>2</sub>, O, S and NH.

49. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of [H and] a C<sub>1</sub> - C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

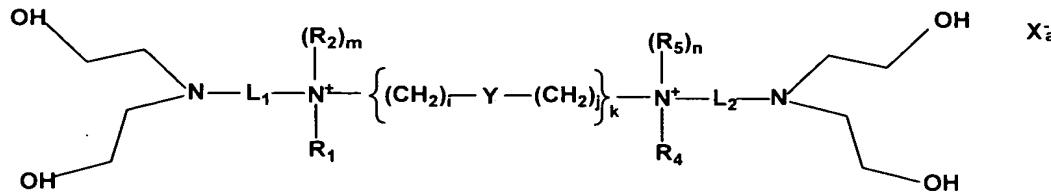
m and n are 0 or 1;

i and j are integers from about 2 to about 3;

k is an integer from 1 to about 3;

$L_1$  and  $L_2$ , independently from one another, are an alkylene or an alkylene ether; and  $Y$  is selected from the group consisting of  $CH_2$ ,  $O$ ,  $S$  and  $NH$ .

56. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of  $R_1$  and  $R_4$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

$R_2$  and  $R_5$ , independently of one another, are selected from the group consisting of [H and] a  $C_1$  -  $C_8$  alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

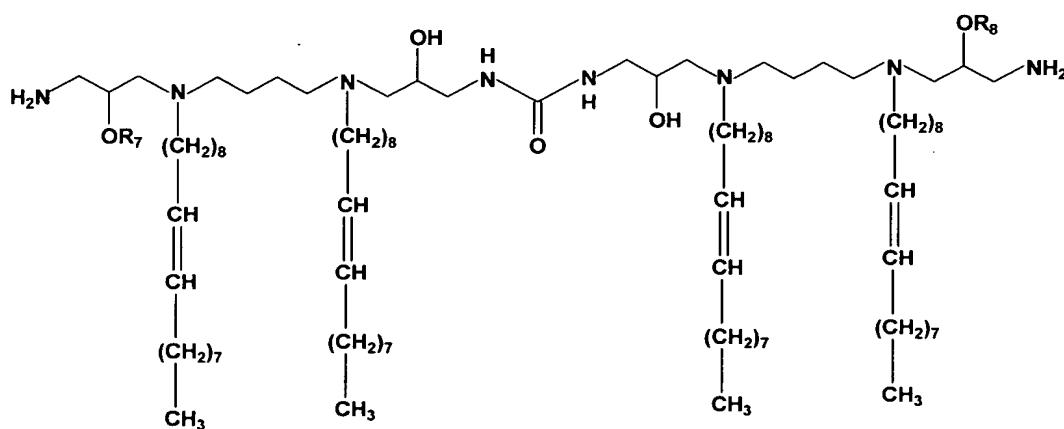
$m$  and  $n$  are 0 or 1;

$i$  and  $j$  are integers from about 2 to about 3;

$k$  is an integer from 1 to about 3;

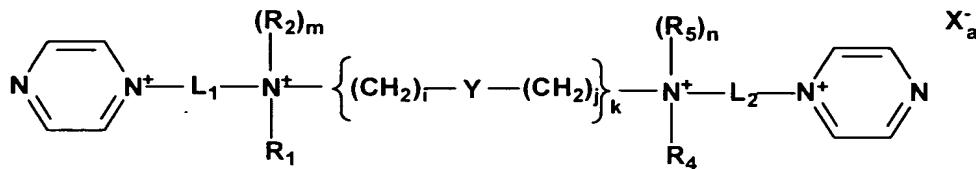
$L_1$  and  $L_2$ , independently from one another, are an alkylene or an alkylene ether; and  $Y$  is selected from the group consisting of  $CH_2$ ,  $O$ ,  $S$  and  $NH$ .

61. (Once amended) [The] A compound [as claimed in claim 5, which is] having the formula:



wherein  $R_7$  and  $R_8$  are independently H or a carbohydrate.

64. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] **each** of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of [H and] a C<sub>1</sub> - C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

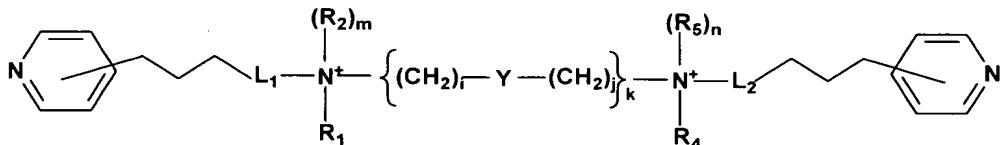
m and n are 0 or 1;

i and j are integers from about 2 to about 3;

k is an integer from 1 to about 3;

L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether; and Y is selected from the group consisting of CH<sub>2</sub>, O, S and NH.

71. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] **each** of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of [H and] a C<sub>1</sub> - C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

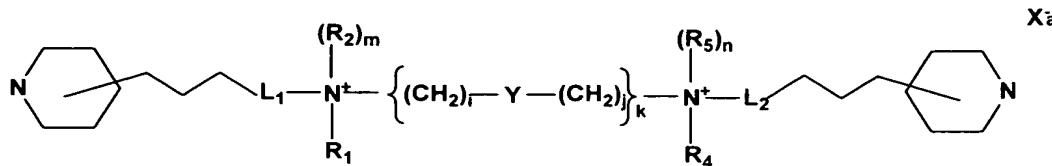
m and n are 0 or 1;

i and j are integers from about 2 to about 3;

k is an integer from 1 to about 3;

L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether; and Y is selected from the group consisting of CH<sub>2</sub>, O, S and NH.

78. (Once amended) The compound as claimed in claim 5, wherein said compound has the formula:



wherein

[at least one] each of R<sub>1</sub> and R<sub>4</sub> is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms;

R<sub>2</sub> and R<sub>5</sub>, independently of one another, are selected from the group consisting of [H and] a C<sub>1</sub> - C<sub>8</sub> alkyl, alkenyl, aryl, and alkyl optionally substituted by one or more of an alcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group;

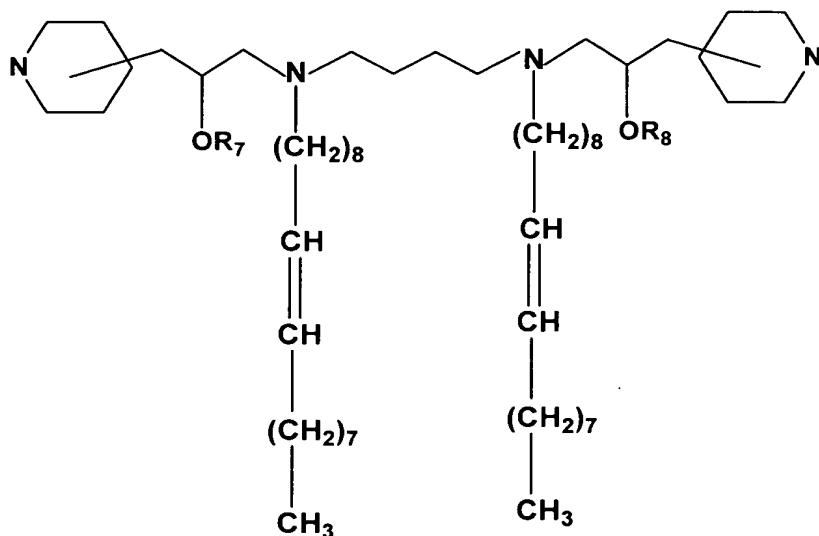
m and n are 0 or 1;

i and j are integers from about 2 to about 3;

k is an integer from 1 to about 3;

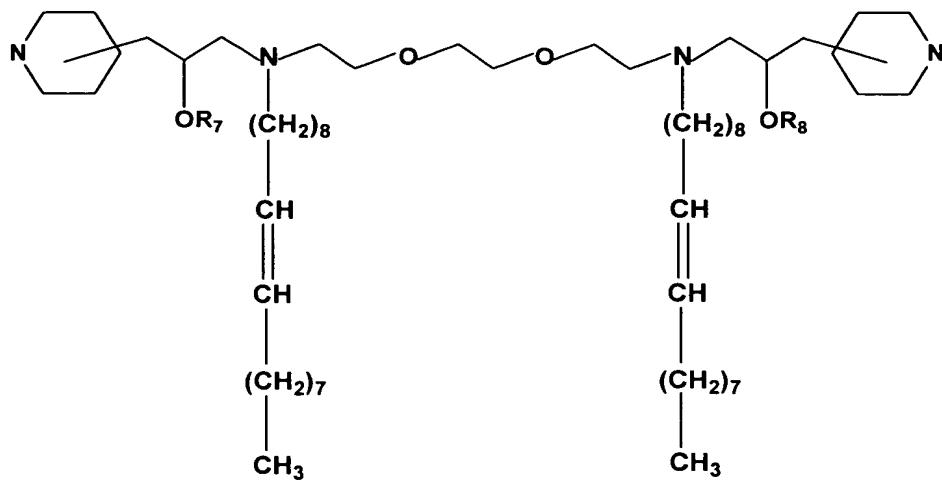
L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether; and Y is selected from the group consisting of CH<sub>2</sub>, O, S and NH.

80. (Once amended) The compound as claimed in claim [78] 5, which is:



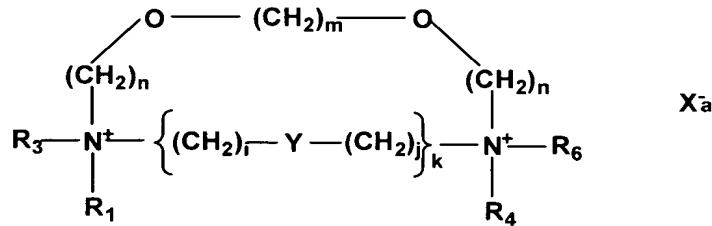
wherein R<sub>7</sub> and R<sub>8</sub> are independently H or a carbohydrate.

82. (Twice amended) The compound as claimed in claim [78] 5, which is:



wherein R<sub>7</sub> and R<sub>8</sub> are independently H or a carbohydrate.

85. (Once amended) [The] A compound [as claimed in claim 1, wherein said compound has] having the formula:



wherein

Y is selected from the group consisting of CH<sub>2</sub>, an ether, a polyether, an amide, a polyamide, an ester, a sulfide, a urea, a thiourea, a guanidyl, a carbamoyl, a carbonate, a phosphate, a sulfate, a sulfoxide, an imine, a carbonyl, and a secondary amino group and wherein Y is optionally substituted by -X<sub>1</sub>-L'-X<sub>2</sub>-Z or -Z;

R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub>, independently of one another, are selected from the group consisting of H, -(CH<sub>2</sub>)<sub>p</sub>-D-Z, an alkyl, an alkenyl, an alkynyl, an aryl, and [an alkyl or] an alkyl ether, wherein any one of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>6</sub> are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, an alkylthio, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least one of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> is a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from 6 to about 64 carbon atoms; and R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> may optionally be covalently linked with each other or with Y, to form a cyclic moiety;

Z is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, peptide, and protein;

X<sub>1</sub> and X<sub>2</sub>, independently of one another, are selected from the group consisting of NH, O, S, alkylene, and arylene;

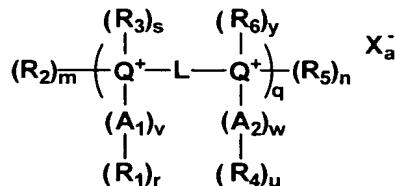
L' is selected from the group consisting of alkylene, alkenylene, alkynylene, arylene, alkylene ether, and polyether;

D is Q or a bond;

m and n are 0 or 1; and

i, j, k, l and p are integers from 1 to about 10.

93. (Once amended) A compound having the formula:



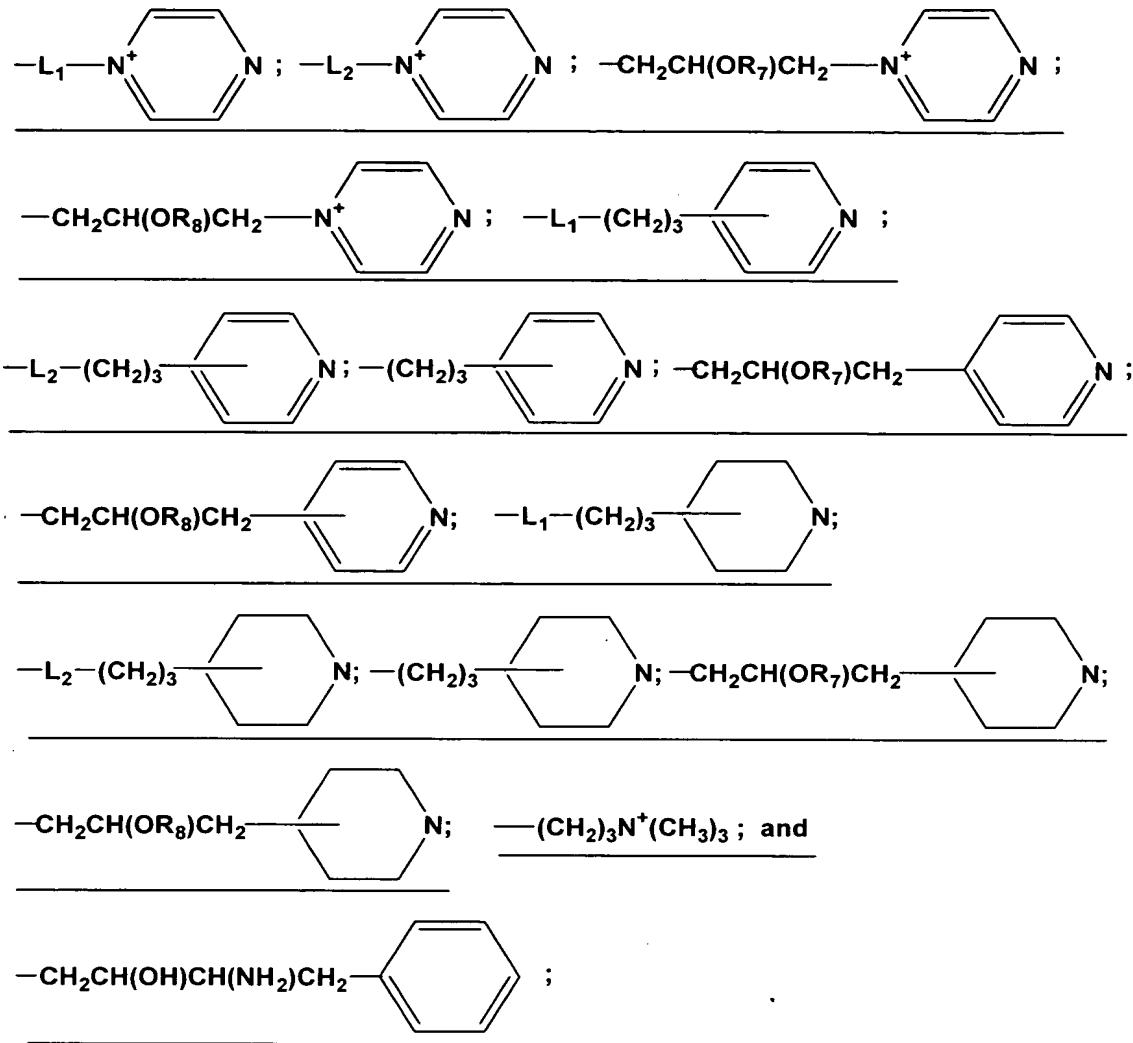
wherein

Q is selected from the group consisting of N, O and S;

L is a bivalent organic radical capable of covalently linking each Q;

R<sub>1</sub> - R<sub>6</sub>, independently of one another, are selected from the group consisting of H, -(CH<sub>2</sub>)<sub>p</sub>-D-Z, an alkyl, an alkenyl, an alkynyl, an aryl, and [an alkyl or] alkyl ether, wherein any one of R<sub>1</sub>-R<sub>6</sub> are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, an alkylthio, a urea, a thiourea, a guanidyl, or a carbamoyl group, and wherein at least one of R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>6</sub> is a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms and at least one of R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub> is selected from the group consisting of

-CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>; -(CH<sub>2</sub>)<sub>b</sub>NHC(O)Z;  
-(CH<sub>2</sub>)<sub>b</sub>NHC(O)Z; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(O)Z; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(O)Z;  
-CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>;  
-L<sub>1</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>; -L<sub>2</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>;  
-(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>3}]</sub>-CH<sub>2</sub>-CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>;  
-(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>3}]</sub>-CH<sub>2</sub>-CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>;



and  $\text{R}_1$  and  $\text{R}_4$  or  $\text{R}_3$  and  $\text{R}_6$  may optionally be covalently linked with each other, or with  $\text{L}$  to form a cyclic moiety;

$\text{Z}$  is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, peptide, and protein;

$\text{D}$  is  $\text{Q}$  or a bond;

$\text{A}_1$  and  $\text{A}_2$ , independently of one another, are selected from the group consisting of  $\text{CH}_2\text{O}$ ,  $\text{CH}_2\text{S}$ ,  $\text{CH}_2\text{NH}$ ,  $\text{C}(\text{O})$ ,  $\text{C}(\text{NH})$ ,  $\text{C}(\text{S})$  and  $(\text{CH}_2)_3$ ;

$\text{X}$  is a physiologically acceptable anion;

$\text{L}_1$  and  $\text{L}_2$ , independently from one another, are an alkylene or an alkylene ether;

$\text{R}_7$  and  $\text{R}_8$ , independently from one another, are an alkylene or an alkylene ether;

$\text{b}$  and  $\text{c}$  are integers independently selected from 1 to about 4;

m, n, r, s, u, v, w and y are 0 or 1, with the proviso that when both m and n are 0 at least one of r, s, u and y is other than 0;

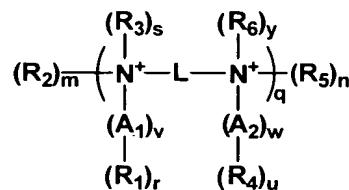
[i, j, k, l,] p and t are integers from 0 to about 100;

q is an integer from 1 to about 1000; and

a is the number of positive charge divided by the valence of the anion.

94. (Twice amended) The compound as claimed in any one of claims 1, 5, 48, 85, 89, [and] 93, and 110 wherein said cyclic group is a cholesteryl group.

95. (Once amended) A compound or a polycation having the formula:



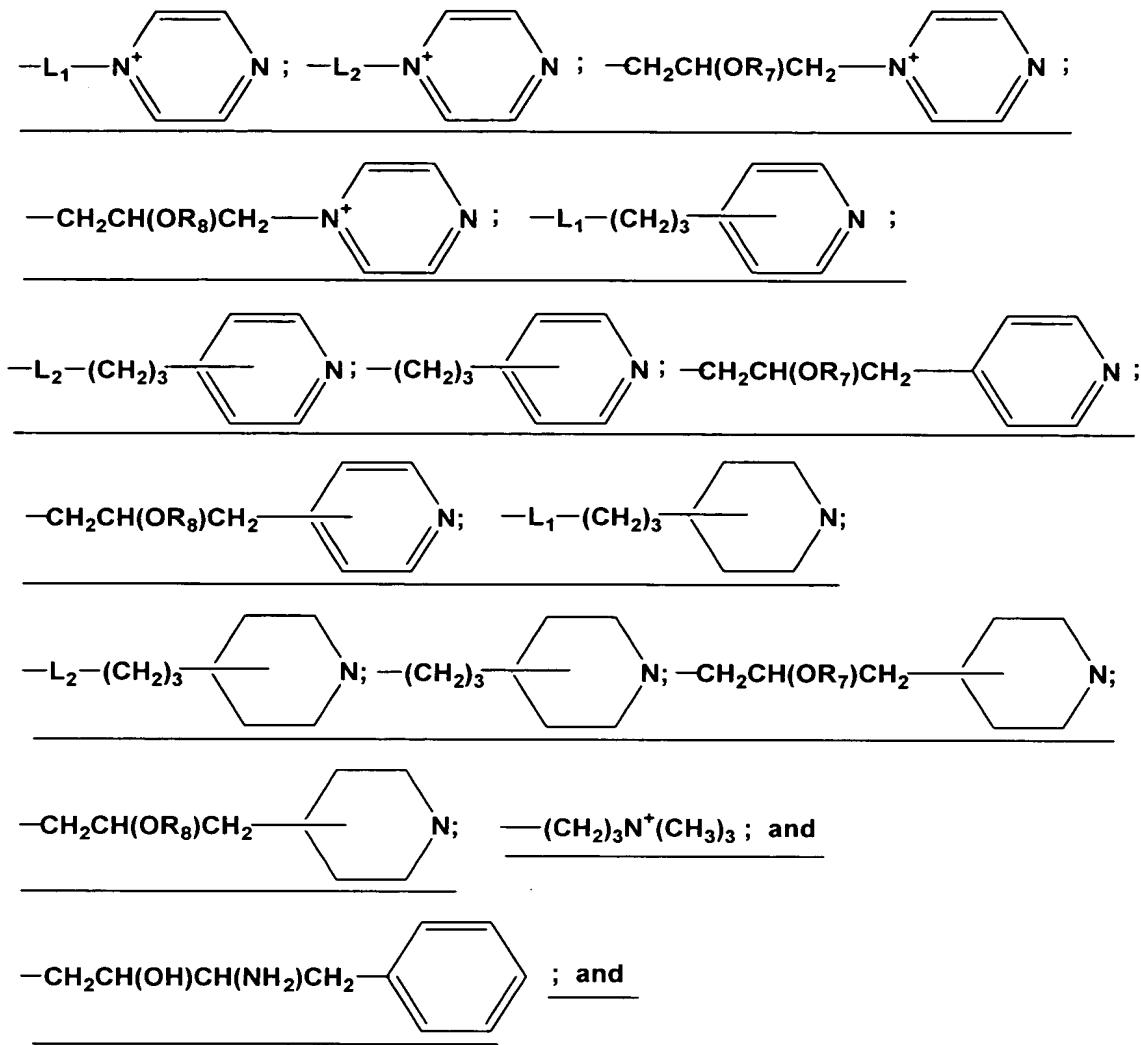
wherein

L is C, CH,  $(\text{CH}_2)_i$ , or  $\{(\text{CH}_2)_i \text{---} \text{Y} \text{---} (\text{CH}_2)_j\}_k$ , wherein Y is selected from the group consisting of  $\text{CH}_2$ , an ether, a polyether, an amide, a polyamide, an ester, a sulfide, a urea, a thiourea, a guanidyl, a carbamoyl, a carbonate, a phosphate, a sulfate, a sulfoxide, an imine, a carbonyl, and a secondary amino group and wherein Y is optionally substituted by  $-\text{X}_1\text{---L}'\text{---X}_2\text{---Z}$  or  $-\text{Z}$ ;

$\text{R}_1$  -  $\text{R}_6$ , independently of one another, are selected from the group consisting of H,  $-(\text{CH}_2)_p\text{---Z}$ , an alkyl, an alkenyl, an alkynyl, an aryl, and [an alkyl or] alkyl ether, wherein any one of  $\text{R}_1$ - $\text{R}_6$  are optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] two of  $\text{R}_1$ ,  $\text{R}_3$ ,  $\text{R}_4$  and  $\text{R}_6$  [is] are a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms attached to each N; provided that

1) when L is alkylene and  $\text{R}_1$  and  $\text{R}_4$  both are alkenyl of about 6 to about 64 carbon atoms, then at least  $\text{R}_2$  and  $\text{R}_5$  or  $\text{R}_3$  and  $\text{R}_6$  are independently selected from the group consisting of

$-(\text{CH}_2)_6\text{---NH}_2$ ;  $-(\text{CH}_2)_8\text{---NH}_2$ ;  $-\text{CH}_2\text{CH}(\text{OR}_7)\text{CH}_2\text{NH}_2$ ;  $-\text{CH}_2\text{CH}(\text{OR}_8)\text{CH}_2\text{NH}_2$ ;  $-(\text{CH}_2)_6\text{NHC(O)Z}$ ;  $-(\text{CH}_2)_8\text{NHC(O)Z}$ ;  $-\text{CH}_2\text{CH}(\text{OR}_7)\text{CH}_2\text{NHC(O)Z}$ ;  $-\text{CH}_2\text{CH}(\text{OR}_8)\text{CH}_2\text{NHC(O)Z}$ ;  $-\text{L}_1\text{---NHC(NH)NH}_2$ ;  $-\text{L}_2\text{---NHC(NH)NH}_2$ ;  $-\text{CH}_2\text{CH}(\text{OR}_7)\text{CH}_2\text{NHC(NH)NH}_2$ ;  $-\text{CH}_2\text{CH}(\text{OR}_8)\text{CH}_2\text{NHC(NH)NH}_2$ ;  $-\text{L}_1\text{---N}(\text{CH}_2\text{CH}_2\text{OH})_2$ ;  $-\text{L}_2\text{---N}(\text{CH}_2\text{CH}_2\text{OH})_2$ ;  $-(\text{CH}_2)_4\text{N}[(\text{CH}_2)_8\text{---CH=CH---}(\text{CH}_2)_7\text{---CH}_3]\text{---CH}_2\text{---CH}(\text{OR}_7)\text{CH}_2\text{NH}_2$ ;  $-(\text{CH}_2)_4\text{N}[(\text{CH}_2)_8\text{---CH=CH---}(\text{CH}_2)_7\text{---CH}_3]\text{---CH}_2\text{---CH}(\text{OR}_8)\text{CH}_2\text{NH}_2$ ;



2) when q is 1, R<sub>1</sub> - R<sub>6</sub> are other than H;

L<sub>1</sub> and L<sub>2</sub>, independently from one another, are an alkylene or an alkylene ether;

R<sub>7</sub> and R<sub>8</sub> are independently H or a carbohydrate;

Z is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, amino acid derivative, peptide, and protein;

X<sub>1</sub> and X<sub>2</sub>, independently of one another, are selected from the group consisting of NH, O, S, alkylene and arylene;

L' is selected from the group consisting of alkylene, alkenylene, alkynylene, arylene, alkylene ether, and polyether;

$A_1$  and  $A_2$ , independently of one another, are selected from the group consisting of  $CH_2O$ ,  $CH_2S$ ,  $CH_2NH$ ,  $C(O)$ ,  $C(NH)$ ,  $C(S)$  and  $(CH_2)_i$ ;

**b and c are integers independently selected from 1 to about 4;**

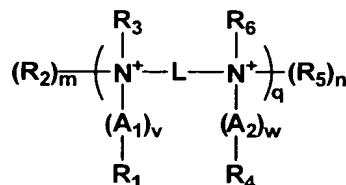
$m$ ,  $n$ ,  $r$ ,  $s$ ,  $u$ ,  $v$ ,  $w$  and  $y$  are 0 or 1, with the proviso that when both  $m$  and  $n$  are 0 at least one of  $r$ ,  $s$ ,  $u$  and  $y$  is other than 0;

$i$ ,  $j$ ,  $k$ ,  $l$ ,  $p$  and  $t$  are integers from 0 to about 100; and

$q$  is an integer from 1 to about 1000.

96. (Once amended) The compound or the polycation as claimed in claim 95, wherein at least [one] **two** of  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$  is a straight chain or branched, cyclic, [alkyl,] alkenyl, alkynyl or aryl group having from about 8 to about 24 carbon atoms.

97. (Once amended) A compound or a polycation having the formula:



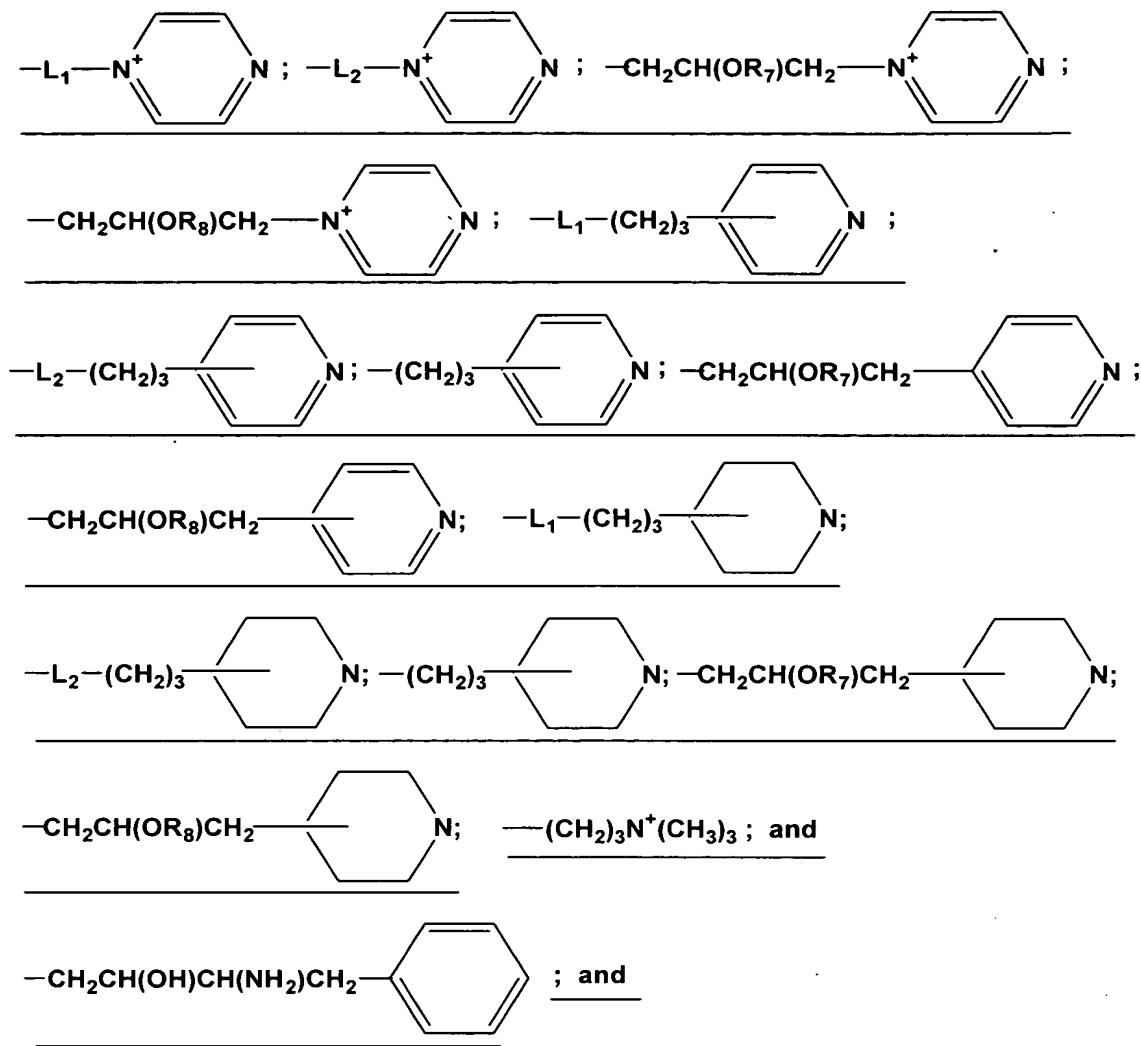
wherein

$L$  is  $(CH_2)_i$  or  $\{(CH_2)_i - Y - (CH_2)_j\}_k$ , wherein  $Y$  is selected from the group consisting of  $CH_2$ , an ether, a polyether, an amide, a polyamide, an ester, a sulfide, a urea, a thiourea, a guanidyl, a carbamoyl, a carbonate, and a secondary amino group;

$R_1$  -  $R_6$ , independently of one another, are selected from the group consisting of  $H$ ,  $-(CH_2)_p-Z$ , an alkyl, an alkenyl, **an alkynyl**, an aryl, and [an alkyl or] an alkyl ether, **wherein any one of R<sub>1</sub>-R<sub>6</sub> are** optionally substituted by one or more of an alcohol, an aminoalcohol, an amine, an amide, an ether, a polyether, a polyamide, an ester, a mercaptan, a urea, a thiourea, a guanidyl, or a carbamoyl group, and at least [one] **two** of  $R_1$ ,  $R_3$ ,  $R_4$  and  $R_6$  [is] **are** a straight chain or branched, cyclic, alkyl, alkenyl, alkynyl or aryl group having from about 6 to about 64 carbon atoms **attached to each N; provided that**

1) **when L is alkylene and R<sub>1</sub> and R<sub>4</sub> both are alkenyl of about 6 to about 64 carbon atoms, then at least R<sub>2</sub> and R<sub>5</sub> or R<sub>3</sub> and R<sub>6</sub> are independently selected from the group consisting of**

**-(CH<sub>2</sub>)<sub>b</sub>-NH<sub>2</sub>; -(CH<sub>2</sub>)<sub>c</sub>-NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>; -(CH<sub>2</sub>)<sub>b</sub>NHC(O)Z; -(CH<sub>2</sub>)<sub>c</sub>NHC(O)Z; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(O)Z; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(O)Z; -L<sub>1</sub>-NHC(NH)NH<sub>2</sub>; -L<sub>2</sub>-NHC(NH)NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>7</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>; -CH<sub>2</sub>CH(OR<sub>8</sub>)CH<sub>2</sub>NHC(NH)NH<sub>2</sub>; -L<sub>1</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>; -L<sub>2</sub>-N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>2</sub>; -(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>2</sub>]CH<sub>2</sub>-CH(OR<sub>7</sub>)CH<sub>2</sub>NH<sub>2</sub>; -(CH<sub>2</sub>)<sub>4</sub>N[-(CH<sub>2</sub>)<sub>8</sub>-CH=CH-(CH<sub>2</sub>)<sub>7</sub>-CH<sub>2</sub>]CH<sub>2</sub>-CH(OR<sub>8</sub>)CH<sub>2</sub>NH<sub>2</sub>;**



2) when q is 1,  $\text{R}_1 - \text{R}_6$  are other than H;

$\text{L}_1$  and  $\text{L}_2$ , independently from one another, are an alkylene or an alkylene ether;

$\text{R}_7$  and  $\text{R}_8$  are independently H or a carbohydrate;

$\text{Z}$  is selected from the group consisting of amine, spermiyl, carboxyspermiyl, guanidyl, spermidinyl, putricinyl, diaminoalkyl, pyridyl, piperidinyl, pyrrolidinyl, polyamine, amino acid, amino acid derivative, peptide, and protein;

$\text{A}_1$  and  $\text{A}_2$ , independently of one another, are selected from the group consisting of  $\text{CH}_2\text{O}$ ,  $\text{CH}_2\text{S}$ ,  $\text{CH}_2\text{NH}$ ,  $\text{C}(\text{O})$ ,  $\text{C}(\text{NH})$ ,  $\text{C}(\text{S})$  and  $(\text{CH}_2)_i$ ;

$\text{m}$ ,  $\text{n}$ ,  $\text{v}$  and  $\text{w}$  are 0 or 1;

$\text{i}$ ,  $\text{j}$ ,  $\text{k}$ ,  $\text{l}$ ,  $\text{p}$  and  $\text{t}$  are integers from 1 to about 100; and

$\text{q}$  is an integer from 1 to about 1000.

101. (Twice amended) A composition comprising one or more compounds of any one of claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110.

102. (Twice amended) A composition comprising one or more compounds of any one of claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110 and at least one additional component selected from the group consisting of a cell, cells, a cell culture, a cell culture media, a neutral lipid, a nucleic acid, and a transfection enhancer.

104. (Twice amended) A lipid aggregate comprising one or more compounds of any one of claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110.

107. (Twice amended) A kit comprising one or more compounds of any one of claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110 and at least one additional component selected from the group consisting of a cell, cells, a cell culture media, a nucleic acid, a transfection enhancer and instructions for transfecting a cell or cells.

108. (Twice amended) A method for introducing a polyanion into a cell or cells, said method comprising forming a liposome from a positively charged compound of any one or claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110, contacting the liposome with a polyanion to form a positively-charged polyanion-liposome complex and incubating the complex with a cell or cells.

109. (Twice amended) A method for introducing a biologically active substance into a cell, said method comprising forming a liposome of a compound of any one of claims 1, 37, 38, 48, 61, 85, 93, 95, [and] 97, and 110 and a biologically active substance and incubating the liposome with a cell or cell culture.